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Sulky and Angry Laughter: The Search for Distinct Facial Displays

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Abstract

Although over 200 different types of laughter can be differentiated in German language, very little is known about the facial expression of the different types of laughter. In this paper, the facial expressions of sulky and angry laughter posed by an actor are examined. FACS coding of the presented laugh acts indicates that sulky and angry laughter might have distinct facial expressions. Nevertheless, further studies with a larger number of actors and of types of laughter should be conducted.

Sulky and Angry Laughter: A Comparison of Facial Expressions

Introduction

In German language, more than 200 different types of laughter can be differentiated on a linguistic basis. Besides the well known happy laughter, other laughter qualities, such as embarrassed laughter, contemptuous laughter, loud laughter, convulsive laughter, throaty laughter, and many more are frequently used in everyday language. Around the turn of the last century, some authors (Borée, 1899; Heller, 1902; Huter, 1925/1985; Piderit, 1867/1919; Rudolf, 1903) suggested to distinguish up to 16 different types of laughter on a morphological basis. They not only described the different types of laughter but they also illustrated them. Since the authors do not agree in their descriptions and illustrations, no definite statements can be made about the characteristic facial features of the various laughter qualities. Not only were the historic authors lacking appropriate technical equipment (e.g., video recording, slow motion, frame-by-frame playing) necessary to record quickly occurring facial changes, they also lacked of an objective analysing method to describe what they observed.

Nothing much happened after this period of pioneering research. To date, typically only two types of laughter are separated via their morphological characteristics in FACS-studies of laughter: Duchenne laughter and non-Duchenne laughter (see for example Hochgruber, 2000; Keltner & Bonanno, 1997; Ruch, 1990; Zweyer, Velker, & Ruch, 2004). This is mainly an extension of the knowledge derived from studies of smiling, where the Duchenne display (i.e., joint action of zygomaticus major and orbicularis oculi muscles) is signalling enjoyment while the sole contraction of the zygomatic major is not. No FACS-study aimed at specifically distinguishing further types of laughter has been carried out so far. However, a review of the empirical studies of electromyographic activity of facial muscles during laughter yields a list of Action Units transcending the one defining the Duchenne display by far (see Ruch, 1993; Ruch & Ekman, 2001). Thus, there is the possibility for further, morphologically different, types of laughs to exist. In the present pilot study we want to explore potential differences between sulky and angry laughter by analysing the facial expression of an actor displaying these two putative types of laughs.

Method

Actor. The actor is native speaker of Swiss German and was recruited in Zurich, Switzerland. He is a professional actor and regularly engaged in theatres and movies and was paid for his posing.

Posing of laughter. Within the scope of a broader research project, the actor was asked to pose different laugh acts out of a list of 23 different types of laughter. This list was obtained in a pilot study (Huber & Ruch, 2007). Beside sulky (German term: “trotzig”) and angry (German term: “ärgerlich”) laughter, the list included also further laughter that represented an inner state of the laughing person, for example happy laughter, mischievous laughter, sad laughter, and embarrassed laughter. The two qualities were selected for analysis, as they seemed to be sufficiently different to show a difference in the composition of AUs.

Procedure. The list containing the 23 laughter qualities was given to the actor two weeks before the filming took place. This should give him enough time to prepare for the recording. He was asked to indicate which laughter he could display and put them in an order, beginning with the most difficult laughter and ending with the one easiest to pose. This was also the order, in which the actor was asked to pose the different types of laughter at the recording session. The recording session took place in a laboratory room at the University of Zurich. Two cameras were used to capture the face and the whole body of the actor. If the actor was not certain he displayed the laughter optimally, he was allowed to repeat it up to three times.

Analysis. The produced laugh acts were coded frame-by-frame with the Facial Action Coding System (FACS, Ekman, Friesen & Hager, 2002). FACS is an anatomically based system for measuring all visually distinguishable facial movements on the basis of 44 Action Units (AUs). The two laugh acts, sulky and angry laughter, were coded by two certified FACS coders. Any discrepancies in the coding were discussed until the two coders reached agreement.

Results

The actor posed all of the 23 types of laughter on the list given to him. Sulky laughter was the 17th laughter he displayed and angry the 22nd laughter. Thus, he thought angry laughter to be easier to pose than sulky laughter. FACS coding revealed the occurrence of different AUs for the two laugh acts.

Sulky laughter

The duration of sulky laughter displayed by the actor was approximately 3.5 seconds. Four characteristic stages were selected for illustration and screen shots, together with the FACS coding, are given in Figure 1.

Insert Figure 1 about here

Figure 1a illustrates the beginning of sulky laughter. Along with the first sound utterance, the head was thrown upwards and tilted to the right. Because the actor was still looking at the person at whom the laughter was directed, he was looking down. The actor showed the Duchenne display, which remained visible during the whole laugh act until the end of it. At time 05:41:20, about one second after the laugh act had started, further Action Units supervened. The actor showed an AU20 and he moved the head back (Figure 1b). Vocalisation was still audible. About one second later (Figure 1c), the actor initiated the ending of the laugh act by bringing the head back in a vertical position and reducing the aperture of the mouth. Vocalisation was audible until the laughter faded out. Figure 1d shows the fading out of sulky laughter with an expression that was typical for this actor: He pulled the mouth corners down.

Angry laughter

Angry laughter had a duration of approximately 6 seconds. Screenshots of the facial expression along with the FACS-code are shown in Figure 2.

Insert Figure 2 about here

This sample of angry laughter began with a Duchenne display, which remained visible during almost the whole laughter. The actor showed an AU14 on the left side of the face and tilted the head to the left (Figure 2a). At time 07:16:18, about 1.5 seconds after the laugh act had started AU14 and AU55 were not observable anymore. Instead, the head was pulled up and turned slightly to the left. The actor looked down at the imagined recipient of the laughter. During this time, the actor displayed AU10 on the right side of the face (Figure 2b). Towards the end of the laugh act, the head was brought back to a normal position and the Duchenne display disappeared and AU20 and AU14 emerged (Figure 2c). The mouth was

less opened than before. Vocalisation started about 1.5 seconds after the laugh act began and remained audible until the laugh act was finished.

Discussion

This paper presented a comparison of the facial expression of sulky and angry laughter posed by one actor. Interestingly, both laugh acts involved the Duchenne display at some point in time. The Duchenne display typically is indicating joy (Ruch & Ekman, 2001), and hence it will be interesting to see whether or not in the decoding studies naïve raters will perceive them to contain joy as well. If actors encoded joy (i.e., the Duchenne display) and respondents perceive them as joyful then this raises the question whether these laughs might be seen as blends, or variations of one basic type of laugh.

However, the actor clearly understood that the presented 23 laughs are different and the FACS coding of these two laugh acts revealed that he produced them morphologically different. In detail, he used additional AUs (sulky: AU20, angry: unilateral AU14 and AU10, bilateral AU20) and head movements. These findings may be seen as an initial hint that different facial expressions might exist for different types of laughter. Further 30 actors from Austria, Germany, and Switzerland will be tested and this will allow examining whether prototypical displays for these two putative laugh types exist, and whether these AUs represent characteristic features. If actors agree on distinct facial displays for a list of types of laughs these will then have to be validated in studies of laypeople experiencing those associated emotion qualities and laughing spontaneously in corresponding situations.

Obviously, no definite conclusion can be made about the facial characteristics of sulky and angry laughter. A clear limitation of this pilot study arises from the fact that the laugh act was displayed only once by the actor. Consequently, variations in the same actor's posing cannot be taken into account. By posing a laughter quality at repeated points in time, temporal steady displays of this laughter can be obtained. However, the generalizability across different posers is considered to be a more important criterion, which in turn, is of limited value if the derived pattern cannot be verified in spontaneous emotionally triggered laughter. Thus, further studies, which allow for these implications should be made in order to make definite statements about the distinct facial expression of various types of laughter.

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Figure Captions

Figure 1. Typical phases of sulky laughter and corresponding FACS coding. 1a = beginning; 1b and c = middle part; 1d = ending. The following numbers represent Action Units, the changes in the face caused by them, and the facial muscle underlying the Action Unit: 6 = pulls the skin towards the eye causing crow's feet wrinkles (Orbicularis oculi, pars orbitalis); 7 = tightens the eyelids causing the lower eyelid to raise (Orbicularis oculi, pars palpebralis); 12 = pulls the lip corners back and upwards (Zygomaticus major); 20 = pulls the lips laterally towards the ears (Risorius); 25 = lips are parted; 27 = mandible is pulled down; 53 = head is up; 56 = head is tilt right; 58 = head is back; 64 = eyes are down.

Figure 2. Typical phases of angry laughter and corresponding FACS coding. 1a = beginning; 1b and c = middle part; 1d = ending. The following numbers represent Action Units, the changes in the face caused by them, and the facial muscle underlying the Action Unit: 6 = pulls the skin towards the eye causing crow's feet wrinkles (Orbicularis oculi, pars orbitalis); 7 = tightens the eyelids causing the lower eyelid to raise (Orbicularis oculi, pars palpebralis); 10 = raises the upper lip (Levator labii superioris, caput infraorbitalis); 12 = pulls the lip corners back and upwards (Zygomaticus major); 25 = lips are parted; 27 = mandible is pulled down; 51 = head is turned left; 53 = head is up; 55 = head is tilt left; 62 = eyes are turned right; 64 = eyes are down; 82 = shoulder shrug; L = Action Unit present on the left side of the face; R = Action Unit present on the right side of the face.



Figure 1. Typical phases of sulky laughter and corresponding FACS coding. 1a = beginning; 1b and c = middle part; 1d = ending. The following numbers represent Action Units, the changes in the face caused by them, and the facial muscle underlying the Action Unit: 6 = pulls the skin towards the eye causing crow's feet wrinkles (Orbicularis oculi, pars orbitalis); 7 = tightens the eyelids causing the lower eyelid to raise (Orbicularis oculi, pars palpebralis); 12 = pulls the lip corners back and upwards (Zygomaticus major); 20 = pulls the lips laterally towards the ears (Risorius); 25 = lips are parted; 27 = mandible is pulled down; 53 = head is up; 56 = head is tilt right; 58 = head is back; 64 = eyes are down.



a)

FACS coding: 6+12+L14+55



b)

FACS coding: 6+7+R10+12+25+27+51+

53+62+64+82

Vocalisation



c)

FACS coding: 7+R10+14+20+25+

27+51+62+82

Vocalisation

Figure 2. Typical phases of angry laughter and corresponding FACS coding. 1a = beginning; 1b and c = middle part; 1d = ending. The following numbers represent Action Units, the changes in the face caused by them, and the facial muscle underlying the Action Unit: 6 = pulls the skin towards the eye causing crow's feet wrinkles (Orbicularis oculi, pars orbitalis); 7 = tightens the eyelids causing the lower eyelid to raise (Orbicularis oculi, pars palpebralis); 10 = raises the upper lip (Levator labii superioris, caput infraorbitalis); 12 = pulls the lip corners back and upwards (Zygomaticus major); 25 = lips are parted; 27 = mandible is pulled down; 51 = head is turned left; 53 = head is up; 55 = head is tilt left; 62 = eyes dare turned right; 64 = eyes are down; 82 = shoulder shrug; L = Action Unit present on the left side of the face; R = Action Unit present on the right side of the face.